

2017

Aquatic and Riparian Restoration Annual Report



USDA Forest Service
Pacific Northwest Region



for the greatest good

USDA Forest Service Pacific Northwest Region

2017 Aquatic and Riparian Restoration

Annual Report

This annual aquatic and riparian restoration report showcases the extraordinary restoration projects occurring throughout the Pacific Northwest Region of the USDA Forest Service. Although this report only features one 2017 project per Forest, it demonstrates the diversity of projects occurring annually in the Region. We have restoration experts at each Forest and regional restoration assistance teams to help each unit when additional, higher end expertise is needed for aquatic and riparian restoration and aquatic organism passage projects. We, as the Pacific Northwest Region, maintain our reputation as aquatic and riparian restoration experts because our leaders recognize the value of the programs in place to maintain our expertise and recognize that mastery is a hallmark of our Region. Enjoy the 2017 USDA Forest Service Pacific Northwest Region Aquatic and Riparian Restoration Report. If you want to learn more about each Forests' restoration program, please don't hesitate to contact them.

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Colville National Forest

West Branch LeClerc Creek

The West Branch LeClerc Creek is home to some of the highest quality bull trout and cutthroat habitat on the Colville National Forest. The recent decommissioning of 1.8 miles of roads and the relocation of 1.9 miles of roads were essential to the restoration of the watershed.



Decommissioning of closed road

The 1.8 miles of decommissioned roads were decompacted and recontoured. This part of the project removed 17 road-stream crossings, restoring natural stream hydrology, channel bed and banks dimensions, and upstream fish migration at those locations.

The relocation of 1.9 miles of road allowed for decommissioning a road with 3 fish barrier culverts. A 0.7 mile segment of new road was constructed in a new location and connected to an existing road with upgraded fish passage structures on private timber corporation company land. The road decommissioning and relocation allowed for reconnecting over five miles of fish habitat, improving cutthroat and designated bull trout critical habitat, improving core grizzly bear habitat (due to reduction of open road density), and reducing sediment delivery to streams.



Pre-project barrier on West Branch LeClerc Creek



Post-project on West Branch LeClerc Creek



Old road (lower) replaced with new road (upper).

For more information on this project and other restoration projects on the Colville National Forest, contact Karen Honeycutt, Natural Resources Program Manager (Fisheries, Wildlife, TES, Soil and Water) at khoneycutt@fs.fed.us.

Columbia River Gorge National Scenic Area

Upper Hamilton Creek Restoration

The western half of the 80 mile long Columbia River Gorge National Scenic Area (CRGNSA) has a multitude of tributary rivers and streams rushing toward the Columbia River. Because there is so much riparian habitat in this portion of the Gorge, most west-side Gorge restoration work is riparian oriented.



Aerial view of LWD placement where trees were pinned around existing tree. Wood placement also occurred in the high flow channel (right portion of photo). There were approximately 40 pieces of wood installed at this site.

Historically, most of these Columbia River Gorge tributaries had more large wood in them than they do today. Logging activities in the last century removed a great deal of in-stream wood. Without natural wood falling into those streams from the forest, streams became more channelized and linear, allowing water to run quickly to the Columbia River. This simplified previously complex habitat. To restore stream channel and floodplain complexity and provide better habitat for federally listed fish, large wood is returned to streams. This creates riffles (providing spawning areas for fish) and pools (for adult fish resting areas, and juvenile fish hiding areas).

In 2017, the USFS-CRGNSA partnered with the Lower Columbia Estuary Partnership (LCEP) to improve in-stream and riparian habitat on Hamilton Creek.



Placement of large wood in Hamilton Creek and its floodplain

The project area is located on the Washington side of the CRGNSA, just north of the town of North Bonneville. This project was deemed an Essential Project in CRGNSA's 2011 Tanner/Hamilton Watershed Restoration Action Plan.

Previously stockpiled trees and tipped trees were strategically placed by helicopter and excavator in and above side-channels to reestablish habitat. While the emphasis is on restoring habitat for federally listed fish species such as Lower Columbia River (LCR) steelhead and LCR Coho Salmon, amphibians, small to medium sized mammals, and birds will also benefit.



Wood placement in high flow channel.



Large wood placed in a high-flow channel of Hamilton Creek.

In 2018, this Upper Hamilton Creek project area will be planted with thousands of conifer seedlings (mostly cedar) to encourage future recruitment of wood into Hamilton Creek. Hundreds of willows will also be planted, which will benefit migratory nesting birds and other wildlife species.



A large log jam structure was built in Hamilton Creek. The tops of some of the logs were roughened to appear natural.

USFS-CRGNSA has successfully partnered with LCEP on a number of other effective riparian projects in recent years, including Horsetail Creek and Thousand Acres floodplain restoration projects on the Oregon side of the Columbia River.

If you have questions about Upper Hamilton Creek Restoration Project or other projects on the CRGNSA, please contact CRGNSA wildlife and fisheries biologist Brett Carré at btcarre@fs.fed.us.



The photos in this column depict a reach of Hamilton Creek where approximately 40 pieces of large wood were placed in the stream channel and floodplain.



Deschutes National Forest Goose Creek AOP Project

The Deschutes National Forest, utilizing Federal Highways Administration funds, replaced an undersized, perched culvert that restricted fish passage on Goose Creek at the crossing located on Century Drive (Deschutes County Road 46). Fish passage was restored to a half mile of habitat upstream of the crossing. Goose Creek is a tributary to Sparks Lake and is located on the Bend/Ft. Rock Ranger District of the Deschutes National Forest. The stream is approximately 26 miles west of Bend, Oregon. The hydraulic jump at the outlet of the steel pipe restricted fish and other aquatic organism upstream passage.



Pre-project view of the outlet of the fish migration barrier on Goose Creek

The undersized metal pipe was replaced with a bottomless, pre-cast concrete arch culvert with a bankfull width wider than the active stream channel, allowing for floodplain formation under the road. Century Drive/ Cascade Lakes Scenic Highway, which provides access to numerous popular recreation lakes in the Upper Deschutes River sub-basin and receives heavy vehicular traffic, was kept open during the construction period, presenting an engineering challenge. Traffic was restricted to one lane, with the downstream half of the culvert installed first. The project was implemented from late June to early November, 2017.

Sparks Lake and Goose Creek are inhabited by introduced Westslope Cutthroat Trout, Eastern Brook Trout, Western Toad, Tailed Frog, and other amphibians. The project design utilized Stream Simulation to allow fish passage and channel stability. A riffle with fish resting rocks constructed under the highway totaled 160 feet in length. Approximately 30-40 feet of stream channel upstream and downstream of the crossing was restored to the proper bankfull width, reducing widths at both the inlet and outlet. The channel slope through the crossing was reduced from 3.2% pre-project to 2.5% post-project, utilizing a boulder cross vane structure for grade control.



Post-project view of the Goose Creek Outlet with the corrected downstream channel width.

Nearby willows and sedges were transplanted onto the banks and floodplain and mulch was applied. Additional rooted willows and native grass seed will be planted in the spring of 2018.

For more information on this project contact Tom Walker, District Fisheries Biologist at twalker@fs.fed.us; for other restoration projects on the Deschutes National Forest, contact Jason Wilcox, Forest Fisheries Biologist jmwilcox@fs.fed.us or Jason Gritzner, Forest Hydrologist, jgritzner@fs.fed.us.

Fremont-Winema National Forest

Upper Sycan River Aquatic Habitat Restoration



In 2017, restoration continued on the upper Sycan River, stabilizing eroding stream banks and increasing habitat complexity. The Upper Sycan River Watershed lies at the far northeastern point of the Klamath Basin province. The watershed area is approximately 65,700 acres with 86% managed by the Fremont-Winema National Forest. The remaining 14% is privately owned. The Upper Sycan River flows for approximately 27 miles from its headwaters, crossing both federal and private lands.

In 2016, the Paisley Ranger District in cooperation with the Withers Ranch, Desert Fish Habitat Partnership, and Fremont-Winema Resource Advisory Council began a multi-year restoration project covering 3.0 miles of the Upper Sycan River, including the construction of a riparian exclosure fence. The goals of the project were to restore hydrologic, aquatic, and riparian ecological function to the benefit of aquatic and riparian dependent species. The project objectives included curtailing streambank erosion/instability thus decreasing the amount of fine sediment delivery to the Upper Sycan River, creating large wood complexes to increase habitat complexity,

cover, and scour points for pool formation, restoring native riparian vegetation (sedge, grass, and willow) to stream side areas, reestablishing floodplain terraces to help restore riparian areas and decrease erosive power, improving aquatic habitat conditions (cover, pools, and gravels), and improving water storage and hyporheic exchange within a high elevation (6,600') meadow reach by restoring riparian condition and floodplain connectivity.

This project occurs along a 3.0 mile reach of the Upper Sycan River between the Rock Creek Forest Camp and the Hanan Trailhead. The project area is occupied habitat for Miller Lake Lamprey, Pit-Klamath Brook Lamprey, Klamath Speckled Dace, and Redband Trout. Additionally, the project area is also designated a Wild and Scenic River, of which fisheries was one of the three outstanding remarkable values of the designation. The restoration occurs in designated critical habitat for Bull Trout and is listed as a necessary recovery action. The project is an essential project in the Upper Sycan River priority watershed restoration action plan.

Large wood complexes were added to the Upper Sycan River over a 1.5 mile reach of stream. Approximately 150 trees were removed from nearby forests, targeting dead or dying lodgepole pine. The addition of the large wood complexes provide stream channel stability, habitat complexity, and cover and pools for fish.



Upper Sycan River before (left) and after (right) restoration

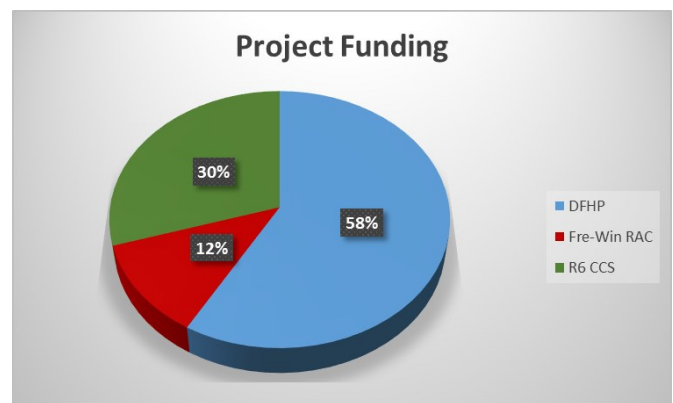


Upper Sycan River before (left) and after (right) restoration

The project also involved reestablishing floodplain terraces and stabilizing streambanks by planting whole willows and sedge/sod mats. Streambank stabilization involved recontouring actively eroding streambanks, creating floodplain terraces using an excavator to match streambank contours upstream and downstream of the eroding areas. This will allow for high stream flows to access the floodplain, decreasing stream bank erosion. Sedge/sod mats were placed at toes of newly recontoured streambanks and gravel was placed in the stream.

The project was a partnership between Wiithers Ranch, (a permittee contributing fence material, exclosure fence location layout, and the willingness to adjust grazing strategies for aquatic habitat recovery), the Desert Fish Habitat Partnership (providing funds), the Fremont-Winema Resource Advisory Committee SRS Title II Funds (providing funds), the USFS/BLM Interagency Road Crew (contributing heavy equipment and operators), and the Fremont-Winema National Forest.

Total project cost over the 3 year implementation period was \$100,850. This included \$58,850 from the Desert Fish Habitat Partnership, \$30,000 from the USDA Forest Service, and \$12,000 from the Fremont-Winema Resource Advisory Committee.



For more information on this project contact Rich Pyzik, Eastside Zone Fisheries Biologist, Fremont-Winema National Forest at rpyzik@fs.fed.us. For forestwide fisheries information, contact Phillip Gaines at phillipgaines@fs.fed.us.

Gifford Pinchot National Forest

Yellowjacket Side Channel Project

The Gifford Pinchot National Forest reconnected and improved the quality of side channels to Yellowjacket Creek to create valuable off channel spawning and rearing habitat for ESA listed Chinook and Coho salmon. The project objective was to restore perennial flow in abandoned relief channels and thereby restore hydrological connectivity along approximately 1,000 feet of channel corridor. This objective was met by deepening the dry channel to intercept a perennial source of shallow cold groundwater. The 2017 accomplishment culminates several years of feasibility monitoring to establish groundwater elevation and recharge capacity for the restoration of side channel flow.

The project is in a priority watershed for salmon and steelhead recovery within the Lower Columbia River and located on National Forest lands in the Lower Cispus Subwatershed. The NW Forest Plan identifies the Lower Cispus corridor as a key watershed for restoration and the State of Washington designated it a top priority reach for salmon recovery.

Dikes and roads lining the floodplain have restricted how surface water flows across the Lower Cispus River valley bottom on the Cowlitz Valley Ranger District. Important fish habitat has been lost where seasonal high waters once replenished productive side channels. Chinook and Coho salmon are dependent on these protective inlets for spawning and rearing. Historically, approximately 75 percent of the anadromous run in the Upper Cowlitz subbasin spawned in this subwatershed and the project area is proven to be a biological stronghold for salmon reproduction and rearing. State Salmon Recovery efforts identify juvenile rearing and over-winter holding habitat as a limiting factor to juvenile salmon success. An excavator was used to tap into subsurface water, reestablishing relatively consistent, cool perennial surface flow in small off channel valley bottom streams. The addition of large wood to the channel increased habitat complexity. The floodplain was treated for weeds and planted with native vegetation along approximately 1 mile of channel. The project benefits Coho and Chinook salmon as well as beaver, wood ducks, and amphibians.

The Yellowjacket Side Channel Project will also serve as a forum for public outreach and environmental education supported by the nearby Cispus Learning Center (CLC) a component of Washington State Education Service District 113. The project site is centered on the CLC outdoor education venue which attracts more than 30,000 students annually. This project will also provide highly valuable Nature Watch opportunities and demonstrate stream restoration techniques for a diverse group of classroom audiences.



An excavator adds large wood to the newly formed Yellowjacket side channel. The wood will add to habitat complexity, providing cover and maintaining pool depth.

Several partners participated in the project. One primary partner, the Cowlitz Indian Tribe, was delegated the lead role in project solicitation, contract award, and administration, increasing efficiency and project effectiveness. Other project partners included the Lower Columbia Fish Enhancement Group, Salmon Recovery Funding Board, Cispus Learning Center, and Waterfall Engineering.

For more information about this project, please contact: Ken Wieman, District Fish Biologist, Cowlitz Valley Ranger District (kwieman@fs.fed.us) or Ruth Tracy, Forest Hydrologist (rtracy@fs.fed.us)

Malheur National Forest East Fork Beech Creek Floodplain

The East Fork Beech Creek Floodplain Reconnection and Large Wood Augmentation Project is within the Upper John Day River subbasin. East Fork Beech Creek and its tributaries contain 19 miles of Mid Columbia River Steelhead Critical Habitat and 9.8 miles of Westslope Cutthroat Trout habitat. When sufficient water is present, these areas can be highly productive.

The East Fork Beech Creek Project restored instream and floodplain complexity, beaver habitat, riparian vegetation, water table elevations, stream sediment processing and channel/floodplain formation, pool quality, and channel/floodplain connection. The project is expected to increase survival rates of threatened MCR juvenile steelhead within sections of the watershed that become intermittent annually.

A four mile reach of the East Fork of Beech Creek was treated with 65 imitation beaver dams known as beaver dam analogues (BDA), 105 large wood jams within the active channel, 33 existing log weir modifications, and 3,500 cottonwoods and 750 mixed willow/dogwood plantings within the floodplain. Nearly 40 acres of the project area were treated for invasive knapweed with another 85 acres of upland and riparian zone planted with native grass seed.

Beaver were historically abundant within the Beech Creek watershed and throughout the John Day basin. Their dams had a strong influence on the vegetative health of riparian corridors and on ground and surface water flow regimes. Overtrapping led to a loss of floodplain connectivity as well as a loss of channel sinuosity and complexity. BDAs are porous, channel spanning structures designed to mimic beaver dams and raise the water table upstream of the structure. BDAs have willow whips and other vegetation interwoven between vertical posts driven into the streambed. The willow cuttings often sprout to form new willow plants, adding to stream channel cover and shade.

Project partners include the Confederated Tribes of Warm Springs Reservation of Oregon, Oregon Department of Fish and Wildlife, the Burns Paiute Tribe, Oregon Natural Desert Association, the North and South Fork John Day Watershed Councils, and the Prairie City High School biology class.

For more information contact Dan Armichardy, BMRD Fisheries Biologist at 541-575-3391; and for other restoration projects on the Malheur NF, contact Steve Namitz, Fisheries Program Manager (snamitz@fs.fed.us) or Tom Friedrichsen, Forest Hydrologist (tfriedrichsen@fs.fed.us)



Large wood added to the East Fork of Beech Creek



Prairie City High School students and volunteers creating BDAs by weaving willow cuttings.

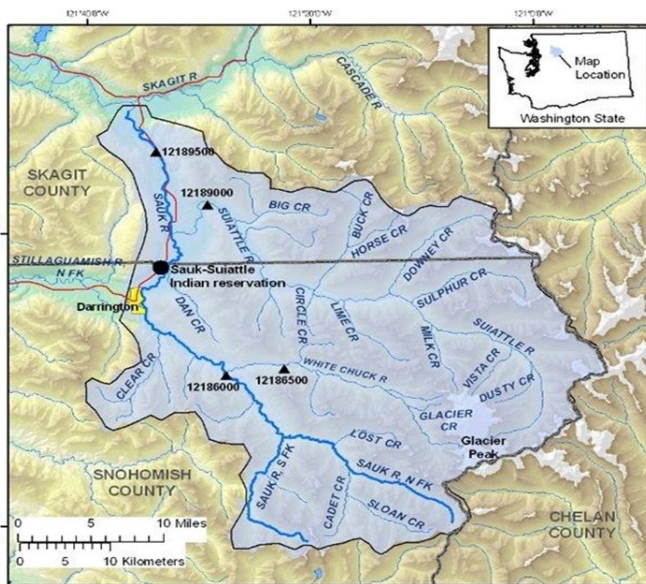
Mt. Baker-Snoqualmie National Forest

Big and Tenas Priority Watershed Restoration

The Big and Tenas Priority Watershed Restoration project implemented priority road decommissioning, storage, and storm-proofing measures in the Suittale River watershed, as part of a suite of Watershed Condition Framework (WCF) priority watershed essential actions. The project benefits federally listed Chinook Salmon, steelhead, Bull Trout, and other salmonid species, such as Coho Salmon and Coastal Cutthroat Trout, by removing road segments from stream side areas and decreasing sediment delivery to streams.



A Caterpillar tractor ripping a section of Forest Road 2643 during decommissioning. Ripping the surface of a road decreases compaction, increases moisture infiltration, and increases the potential for plant establishment.



Sauk River Watershed. Big Creek is on the north end and Tenas Creek is the unnamed stream just south of Big Creek.

The Suittale Access and Travel Management (ATM) Plan analyzed long-term road management needs and identified roads that weren't needed and negatively affected watershed condition. Nine roads were identified for treatment in 2017 and a contract was prepared, based upon 2016 reconnaissance surveys performed by Skagit River System Cooperative (SRSC) personnel.

Work included road decommissioning (both full and partial recontouring), removal of culverts, stream channel and floodplain restoration, road storage, and road storm-proofing (improving culvert capacity, improving roadside ditches, cross draining, and surface rocking).

USDA Forest Service Legacy Roads and Trails funds were used for project implementation. The total cost of the project was \$353,100. These actions restore water quality and improve localized hydrologic conditions in streams by decreasing the degree of road-water interactions in the Big and Tenas creek watersheds, benefiting Chinook Salmon, steelhead and Bull Trout spawning and rearing.

For more information on this project and other restoration projects on the Mt. Baker-Snoqualmie National Forest, contact Richard Vacirca, Fisheries Program Manager (rvacirca@fs.fed.us) or Noel Ludwig, Forest Hydrologist (nludwig@fs.fed.us)

Mt. Hood National Forest

Wrapping up the Still Creek WRAP

Guided by the Still Creek Watershed Restoration Action Plan (WRAP), between 2012 and 2017 the Mt. Hood National Forest and its partners performed extensive restoration work within the Still Creek 6th field watershed. Restoring the health of Still Creek is vital to recover healthy populations of threatened fish and wildlife species there. Total investments in the watershed over the five years amounted to nearly \$2.2 million dollars and have resulted in significant improvements in habitat quality, water quality, and ecosystem function. The detailed completion report can be found at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd563779.pdf

Still Creek Instream restoration actions 2012 to 2017:

Impacted over 8 miles of the Still Creek main channel and an estimated 185 acres of floodplain habitat, including the placement of 2,300 pieces of large wood, creation of 240 log jams, and the reconnection of 6.5 miles of side channels.

2017 Trib D to Still Creek culvert replacement: The original site contained two parallel culverts along Still Creek Road; one 48 inch and one 24 inch diameter culvert. The two were replaced with a single 18 foot wide, open-bottom arched culvert. In addition to reducing sediment transport, the replacement of the Trib D culvert re-opened approximately 2.5 miles of previously blocked tributary habitat to aquatic organism passage.

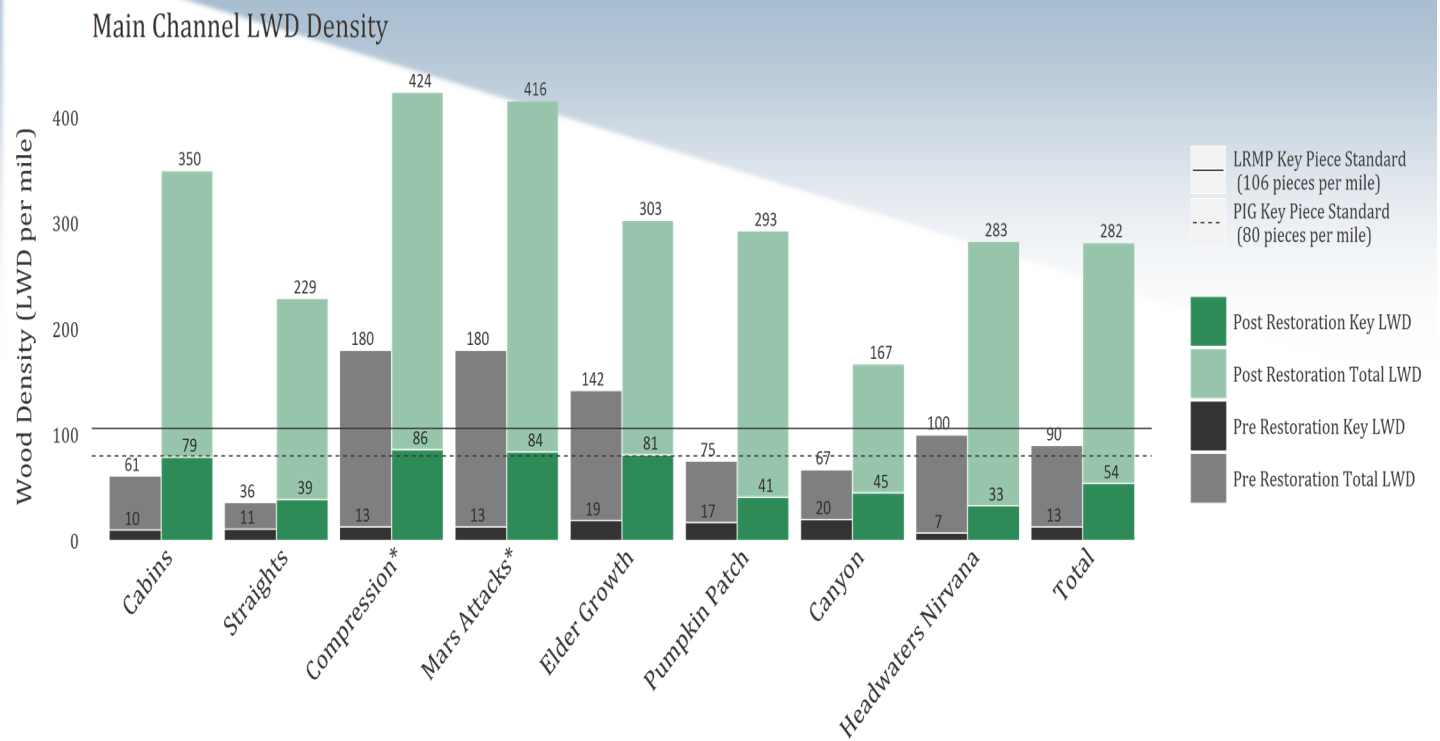
2017 highway road sand reduction project: Sediment retention structures were constructed by ODOT in collaboration with the Forest Service in July 2017. Cumulatively, two miles of US Highway 26 and Oregon State Highway 173 now include 25 check dams, 4 settling basins, and one sump basin that are expected to significantly reduce road-related sediment transport to Still Creek and its tributaries.

For more information about this project on the Mt. Hood National Forest, contact Greg Wanner, District Fish Biologist, gwanner@fs.fed.us. Forestwide information is available from Brad Goehring, Forest Fisheries Biologist (boehring@fs.fed.us) or Todd Reinwald, Forest Watershed Program Manager (treinwald@fs.fed.us).



Pre and Post project view of a reach of Still Creek where a log jam was constructed.

Note the pool formation upstream of the log jam installation after project implemen-



Main channel wood densities compared comparing pre and post restoration survey data in Still Creek restoration reaches from downstream (left of graph) to upstream (right of graph). Key pieces of LWD are defined as pieces of LWD with a minimum length of 50 feet and a minimum diameter of 24" at 50 feet from the largest end.



Pre and Post project aquatic organism passage work completed on Tributary D of Still Creek, pre-project in June 2017 (left) and post-project in October 2017 (right).

Ochoco National Forest McKay Creek Project

In 2017, the Lookout Mountain Ranger District completed the second year of a three year restoration project to reconnect the main channel of McKay Creek to its historic floodplain and improve rearing and spawning habitat. McKay Creek is an important tributary to the NF Crooked River, providing habitat for an experimental population of steelhead and regionally sensitive Redband Trout. The goal of the project was to provide groundwater storage, late-season cold water flow release, and spawning and rearing habitat.

A variety of past land use practices over several decades, such as channelization, floodplain manipulation, logging, and overgrazing, contributed to an incised, simplified stream channel disconnected from the valley floor and former wetland complexes. The incised channel acted like a drain, quickly removing water from the historic floodplain and adjacent wet meadow system, leaving a xeric, hardened, weed-infested area that no longer provided riparian/wet meadow ecological functions nor stored water for release during the low flow season. The lowered water table converted a once perennial stream to an intermittent stream leaving very little holding water and habitat in the summer.

In 2017, the project focused on increasing groundwater storage in an effort to restore perennial flow. The project included channel and floodplain work to remove berms, aggrade the bed of the pre-project channel (up to 5 feet in some cases) to reconnect the wetland complexes to the surface flow, create side channel habitat, improve main channel habitat attributes such as pools, and place woody material across the valley floor. The deeply incised channel was filled with a mixture of gravel, cobble, and fine substrate from the berms and a substantial amount of large wood. The wood was partially buried in small log jam complexes throughout the historic floodplain and main flow paths to slow high flow velocities and spread the flow across the valley floor.

As a result, the valley once again has become charged and water is stored within the floodplain/wetland soils. Upon aggrading the stream channel, flow was restored to a previously dry site. By early fall, mere weeks after implementation was completed, wetland plant species were observed growing where formerly arid compacted soil existed. The project area was seeded with native plants and several thousand more riparian trees and shrubs will be planted in the spring of 2018. An enclosure fence was built to keep cattle from accessing the area while it recovers.

The project was primarily funded with Portland General Electric Pelton-Round Butte Dam upstream mitigation funding, USFS appropriated funds, Title II, and One Tree Planted contributions.

For more information about this project on the Ochoco National Forest, contact Jennifer Mickelson, District Fisheries Biologist (jmickelson@fs.fed.us), or Jon Kochersberger, District Hydrologist (jkochersberger@fs.fed.us)



McKay Creek project 2 months after implementation

Okanogan-Wenatchee National Forest South Summit II Restoration

In the fall of 2017, the Methow Valley Ranger District began Phase 2 of South Summit II Restoration. The goals of Phase 2 were to restore hydrologic connectivity in Jack Creek, make it more resilient to post-fire debris flows, and restore soil function and productivity. The Jack Creek area was targeted by the Forest to improve habitat for aquatic species and upland habitat for wild ungulates. Jack Creek serves as prime deer winter range.

The roads were fully re-contoured and stream channels were reshaped at the crossings to mimic natural surrounding channel morphology and gradient. Bare soil was seeded with a native mix that was propagated in the Methow Valley. The residual woody biomass produced from restoration activities was incorporated into disturbed areas for erosion control, future nutrient availability, and deterrence of off-road motorized recreationists. Three miles of road were decommissioned, five culverts were removed, and approximately one acre of wetland was restored. This is the second year work was done in this area, thanks to an ongoing partnership with Conservation Northwest.

For more information about this project on the Okanogan-Wenatchee National Forest, contact Luke Cerise, North Zone Soil Scientist (lcerise@fs.fed.us) or Lance George, Zone Hydrologist (lgeorge@fs.fed.us). Forestwide information is available from Emily Johnson, Forest Fisheries Biologist (ekjohnson@fs.fed.us) or Molly Hanson, Forest Hydrologist (mahanson@fs.fed.us)



Decommissioned road in South Summit restoration area



Culvert in Jack Creek being removed with application of Watershed BMPs, including dewatering.



Jack Creek after culvert was removed and road decommissioned.

Olympic National Forest

Forest Service Road Treatment Project

In 2010, the Olympic National Forest selected the Calawah River as a focus watershed for restoration, and identified the Sitkum subwatershed for a Watershed Restoration Action Plan (WRAP). The project list created by the WRAP was supported by the Quileute Tribe and the North Pacific Coast Lead Entity for Salmon Recovery.

Due to high road densities, naturally unstable slopes, and a history of previous hillslope failures in the area, road decommissioning of FS Road 2912 and associated spur roads were identified as an essential project. In 2017, a local contractor (Seton Construction) used heavy equipment to remove 25 culverts and restore natural drainage swales and cross drains, complete slope pull-back, install water bars to improve road drainage, and stabilize the newly reconstructed slope using native seed, straw, and mulch. Finally, small trees and slash leftover from the road treatments were scattered over the constructed surface for erosion control.

Approximately 6 miles of road storage and decommissioning were completed in 2017 and 3.3 miles of associated tributary stream habitat were restored. The road treatments are expected to restore natural drainage patterns and prevent largescale mass wasting events commonly associated with negative impacts on fish habitat from unmaintained roads and culverts on steep and unstable slopes. In coming years, the revegetation of the disturbed areas will continue to increase the productivity and stability of the site, reducing surface erosion.

For more information on this project, contact Betsy Krier, Fisheries Biologist, ekrier@usda.gov. For other restoration projects on the Olympic National Forest, contact Tammy Hoem Neher, Fisheries Program Manager (thoemneher@fs.fed.us) or Dana Butler, Forest Hydrologist (danabutler@fs.fed.us).



Completed restoration of natural drainage patterns at a decommissioned road crossing



Completed fill slope pull-back and outcropping of decommissioned road.

Rogue River-Siskiyou National Forest Coal Creek Aquatic Organism Project

The Coal Creek Project is located on the Powers Ranger District, on Forest Service Road 33 (Agness Road) also designated as the "Rogue-Coquille Scenic Byway". The drainage area for the Coal Creek watershed is roughly 9,945 acres and flows into the South Fork Coquille River just below the project site.



The north (above) and south (below) culvert outlets on Coal Creek prior to removal. Their perched elevations impacted fish migration and their small size caused downstream erosion.



The road is a major arterial accessing several communities and a main haul route for the majority of the timber harvested from both federal and private lands. In 1964, a bridge at the project washed out by catastrophic flooding. The bridge was replaced by two

10'X 85' circular culverts, but these culverts were undersized and restricted aquatic organism passage and water flow. The culverts were not designed to withstand large flood events, and the loss of the road could jeopardize vehicle transportation to and from local communities. The project replaced the undersized culverts with a new bridge. It restores access to 0.75 miles of habitat for spring and fall Chinook Salmon, Oregon Coast (OC) Coho Salmon, and Pacific Lamprey.



Bridge constructed in place of the undersized, perched culverts. The stream channel was reconstructed to a natural channel configuration using local river boulders and cobbles.

The total project cost was approximately \$1,442,000. It was completed with funding from the Federal Highway Administration, Weyerhaeuser Timber, and USDA Forest Service. Project partners include Oregon Department of Fish and Wildlife, Coquille Tribe, Powers High School, Coos Bay Bureau of Land Management, Hutton Students from American Fisheries Society, and numerous employees working for the Forest on both Powers and Gold Beach Ranger Districts.

For more information on this project, please contact Karla Cottom, Powers District Fisheries Biologist (kcottom@fs.fed.us) and for more forestwide restoration information, please contact Chris Park, Forest Hydrologist (cpark@fs.fed.us)

Siuslaw National Forest

Boulder Creek Restoration: Blankenship Road Crossing

The Boulder Creek AOP Installation Project created an aquatic organism passage structure on Boulder Creek, which was identified as a high priority fish barrier in the Salmon SuperHighway initiative. The initiative has a goal of improving fish passage through the Nestucca and Tillamook drainages using a prioritized approach.

The project replaced a 9' wide, 32.5' long undersized culvert with a 72' bridge along Blankenship Road across Boulder Creek, a tributary to the Nestucca River, 5 miles east of the community of Beaver in Tillamook County. One remaining barrier is located upstream on the mainstem of Boulder Creek, to be replaced in 2018. The barriers are located downstream of the Siuslaw National Forest. These projects will improve fish passage to four miles of habitat for threatened Coho Salmon, Chinook, steelhead, Cutthroat Trout, and Pacific Lamprey, improve natural sediment and nutrient transport, and mitigate the culvert failure risk in the event of a large storm. By increasing habitat availability in the Boulder Creek watershed, salmonid populations will be more resilient to future impacts.

Blankenship Road is managed by Tillamook County, and has a dairy farm on both sides of the Boulder Creek



crossing. The project partners worked with the landowner to ensure dairy operations were not negatively impacted during construction. The project was a collaborative effort led by the Nestucca-Neskowin Sand Lake Watersheds Council to improve fish passage in the watershed. The Siuslaw National Forest completed the engineering designs and assisted with project oversight during implementation. Other partners included the US Fish and Wildlife Service, Tillamook County Public Works, the Oregon Watershed Enhancement Board, the Bureau of Land Management, Cascade Pacific Resource Conservation and Development, and Oregon Department of Fish and Wildlife.

The total project cost (including planning, design, implementation, etc.) was \$580,851 with over \$76,520 in cash and in-kind support from the USFS, \$50,000 of which was Joint Chiefs initiative funding.

For more information on this project and other restoration projects on the Siuslaw National Forest, contact Chris Hirsch, Forest Fisheries Biologist (chirsch@fs.fed.us) and Kami Ellingson, Forest Hydrologist (kellingson@fs.fed.us)



Before photo of the undersized and worn Blankenship Road crossing at Boulder Creek.



The undersized culvert was replaced with this bridge.

Umatilla National Forest

Wall Creek Fish Passage Restoration

This year's culvert upgrade on Big Wall Creek, just downstream of the South Fork Big Wall Creek confluence, removed the last culvert passage barrier in the Upper Big Wall Creek subwatershed. Essential projects identified in the 2009 whole-watershed action plan and the 2011 subwatershed-specific restoration action plan have been progressively implemented since 2009. The progress was made with funding and other assistance from local partners, including the North Fork John Day Watershed Council and Confederated Tribes of the Warm Springs Indian Reservation (CTWSR).



Fish salvage with district YCC crew.

District staff completed the contracted project with the assistance of a district Youth Conservation Corps (YCC) crew who helped salvage fish from the work site before construction began. The YCCers learned proper fish handling techniques as fish were removed from the work site by an experienced electroshocker. The fish were transported to perennial water further downstream. This project restored year-round fish passage for all life stages of ESA-listed Middle Columbia steelhead throughout the watershed. Road-related sediment inputs have been reduced since 2009 through combinations of road decommissioning, storm damage

risk-reduction modifications to open road segments most at risk to erosion impacts, and road maintenance. The stage is set for the last phase of essential restoration work in the watershed remaining: restoration of instream large wood.



The new road surface at the Road 2402 crossing of Big Wall Creek



This bottomless arch replaced the undersized culvert in Big Wall Creek.

For more information on this project and other restoration projects on the Umatilla National Forest, contact Kathy Ramsey, Forest Fisheries Biologist (kramsey@fs.fed.us) or Joy Archuleta, Forest Hydrologist (jearchuleta@fs.fed.us).

Umpqua National Forest

Elk Creek Tributaries Restoration

Tributaries to Elk Creek were subject to historic stream cleanout, debris torrents, and historic riparian logging. The Elk Creek Tributaries Restoration Project added wood complexes to restore velocity refuges, gravel accumulations, and floodplain connectivity and foster development of complex, multi-thread channels.

Over 500 logs were placed in 3 key tributaries to Elk Creek. Very long logs were hauled, staged and placed using a large logging helicopter to restore habitat in 11 miles of stream. This project occurred in the Elk Creek 5th field watershed which includes two Late Successional Reserves, designated Tier 1 Key watershed, and Critical Habitat for Oregon Coast Coho Salmon. Elk Creek also has populations of winter steelhead and Cutthroat Trout as well as small populations of spring Chinook and fall Chinook salmon. This area was chosen for restoration because the Umpqua National Forest is continuing to focus its spending on areas where restoration will have the largest ecological effect.

Project actions included treating upslope road systems and stream/road crossings to reduce long term chronic sedimentation and risk of road failure. Wood placement was intended to collect the coarse substrate pulse anticipated to be delivered as a result of post fire

headwall and side slope erosion. Some fire-killed riparian trees were placed in the streams when available so valuable helicopter time could be focused on understocked riparian areas where the greatest benefits would be realized. These actions are already having major benefits on the aquatic ecosystems of Callaghan, Drew and Hatchet Creeks. Upslope road treatments were also conducted to prevent road failures and reduce chronic sedimentation. The large wood placement addressed key in-channel habitat deficiencies and capitalized on the short term window of anticipated post fire effects.

Restoration of large wood complexes to the stream channels was accomplished in partnership with Oregon Watershed Enhancement Board, South Umpqua Rural Community Partnership, the Milo Adventist Academy, and the Drinking Water Providers Partnership.

For more information on this project and other restoration projects on the Umpqua National Forest, contact Bob Nichols, Tiller District Fisheries Biologist (renichols@fs.fed.us) or Joe Blanchard, Forest Watershed Program Manager (jhblanchard@fs.fed.us)



Simplified Drew Creek channel prior to project.



Drew Creek after large wood placement.

Wallowa-Whitman National Forest

Lick Creek Culvert Replacement

Lick Creek, a tributary to Big Sheep Creek, provides habitat for Chinook Salmon, steelhead and Bull Trout, and is completely within Forest Service administered lands. In 2013, the stream crossing at FS road 3925-015 was identified as an essential project in the Lick Creek Watershed Restoration Action Plan. The old culvert was undersized, presented a seasonal migration barrier to aquatic species, and periodically overtopped during spring runoff. Approximately 7.5 miles of fish habitat occurred above the culvert. Alan Miller, Wallowa Mountains Office Ranger District, immediately began to work with representatives from Wallow Resources and submitted a proposal to Oregon Watershed Enhancement Board for project funds to help support implementation. Having been selected for OWEB funds, the project was implemented in 2017. Partners and their contributions to the project included:

- Oregon Watershed Enhancement Board = \$78,780
- Grande Ronde Model Watershed/BPA = \$112,200
- Wallowa Resources = \$6,600
- Forest Service = \$130,000

For a final construction contract cost of \$275,000.

For more information on this project and other restoration projects on the Wallowa-Whitman National Forest, contact Joe Vacirca, Fisheries Program Manager (jvacirca@fs.fed.us).



Construction of bridge over Lick Creek.



New road surface over Lick Creek.



Pre-project undersized Lick Creek culvert. Note high velocity water causing a fish migration barrier.



Post-project Lick Creek bridge, providing for stream simulation conditions and aquatic organism passage.

Willamette National Forest

Lower Staley Creek Stage-0 Project

The Lower Staley Creek Stage-0 Restoration Project improved ecological function, as well as biological productivity and resiliency, through process-based stage-0 restoration that addressed the root causes of habitat and water quality degradation in the lower mile (~42 acres) of Staley Creek. Located approximately 24 miles southeast of Oakridge, OR, Staley Creek is a major tributary to the Upper Middle Fork Willamette River 5th field watershed on National Forest land, and is designated as a priority sub-watershed under the Watershed Condition Framework. This project directly supports and enhances the recovery of ESA-Threatened populations of spring Chinook Salmon and Bull Trout, as well as all other naturally occurring native species that utilize floodplain habitats in this watershed.

The restoration effort was needed because lower Staley Creek and its floodplain were severely degraded after decades of human disturbance. During previous ownership, management included riparian clear-cut timber harvest, road and bridge construction within the floodplain, channel straightening and levee construction, and removal of large wood from the stream. These practices arrested natural processes and their function. As a result, lower Staley Creek degraded into a down-cut and simplified stream channel, lacking large wood and habitat complexity historically present here, and was disconnected from its broad floodplain, even at high flows.

Through collaboration and utilization of modern technologies, new strategies were developed to increase the efficiency of implementation, making a project of this scale feasible. A collaborative design team included the Regional Assistance Team for Streams (RATS), the Middle Fork Ranger District, and the Middle Fork Willamette Watershed Council. The team utilized newly available tools and products like LiDAR data, S1 Mobile and tablets, and sub-meter GPS receivers during design and implementation of the project.

Approximately 40,000 cubic yards of material were redistributed to reconnect 42 acres of floodplain. Over 600 trees, ranging from 18-40" diameter, 90-120' in



Lower Staley Creek project construction

length, and typically with root wad, were placed throughout the entire project area to ensure roughness and distribution of flow laterally. The result was a broad floodplain surface with complex habitat, several flow paths and a wide variety of flow velocities, creating habitat for native species and assuring water quality for downstream beneficial uses.

Efforts like the Lower Staley Creek Stage-0 Restoration Project cannot be completed without dedicated partnerships with both public and private entities. Specifically, the Middle Fork Willamette Watershed Council (MFWWC) was instrumental in securing project funding through the Oregon Watershed Enhancement Board as well as contracting, layout, and implementation assistance. Oregon Department of Fish and Wildlife provided much needed assistance in coordinating and implementing the fish salvage operation during construction. Project funding included:

- US Forest Service: \$128,250
- Oregon Watershed Enhancement Board: \$258,608
- Western Native Trout Initiative: \$24,450

Total project cost: \$411,308

For more information on this project and other restoration projects on the Willamette National Forest, contact Johan Hogervorst, Forest Hydrologist (jhogervorst@fs.fed.us) and Brett Blundon, Forest Fisheries Biologist (bblundon@fs.fed.us)



Pre-construction Lower Staley Creek. Notice simplified channel isolated from its floodplain.



Post-construction Lower Staley Creek, after the stream channel was aggraded using the Stage-0 method.



Pre-project Lower Staley Creek. Notice the simplified channel relatively isolated from its floodplain from down-cutting.



Post-project Lower Staley Creek after restoration with the Stage-0 approach. Note in channel complexity and connection to floodplain and margin habitat.

Locations of Forest units in the Pacific Northwest Region of the USDA Forest Service



Look For More Restoration on a Forest Near You!

This report features only one restoration project per Forest in the Pacific Northwest Region of the USDA Forest Service. There's so, so much more restoration happening each year! Please contact your nearest National Forest to learn more about what they are doing to protect and restore your fisheries and riparian habitat and water quality and quantity.



Deer Creek Restoration Project on the Willamette National Forest



Fivemile Bell Restoration Project on the Siuslaw National Forest

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